



Reconstruction of a Complicated Maxillary Defect in a Patient with Salvage Radical Maxillectomy

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The aims of this paper are to show the management of osteoradionecrosis and tumor recurrence on the reconstruction flap after maxillectomy and to describe the ideal flaps for reconstruction. A 50-year-old male with post-operative recurrent squamous cell carcinoma of the right maxillary sinus and post-radiotherapy osteoradionecrosis is presented. Salvage radical excision followed by reconstruction with combined free anterolateral thigh (ALT) flap and pedicled pectoralis major myocutaneous (PMMC) flap is introduced. Uneventful recovery with excellent structural support and aesthetic result are achieved. There is no tumor recurrence during a 7-year follow-up. Although less encouraging results are found in recurrent advanced sinonasal malignancies, with a frustratingly low 5-year survival rate, radical surgical excision still has a role in curing the disease. The consequent facial disfigurement, the most important concern of patients, can be managed by reconstruction with combined free ALT flap and pedicled PMMC flap with excellent outcome.

Key words: anterolateral thigh flap, pectoralis major flap, recurrent maxillary cancer, osteoradionecrosis

INTRODUCTION

Midfacial reconstruction of maxillectomy defects following radical oncological resection presents a challenge to the head and neck surgeon. The reconstruction will be more difficult especially for recurrent patients with osteoradionecrosis (ORN) following previous surgery and radiotherapy. The available recipient vessels and donor tissue are much more limited. The defect is far more extensive and often requires composite tissue replacement in order to minimize problems associated with contour deformity, speech and swallowing. Facial disfigurement is one of the most important patient concerns and can lead to considerable social and psychological stress. Therefore, debate continues as to how to manage best those patients. Some specialists have recommended concurrent chemo-radio-therapy (CCRT) for its smaller impact on facial contour.¹ The relative short residual life expectancy in such late-stage cancer patient also makes

the surgery less worthy. The aims of this paper are to show the management of ORN and tumor recurrence on the reconstruction flap after maxillectomy and to describe the ideal flaps for reconstruction. We claim that surgery still plays an important role in this entity, as long as the reconstruction surgeon is able to repair this huge defect.

CASE REPORT

A 50-year-old man presented to our institution in January 2005 with cancer recurrence involving the right maxillary sinus, previous reconstruction flap, infraorbital region, cheek region and upper lip (Fig. 1). His past history can be traced back to 1997 when he had suffered from squamous cell carcinoma of the right maxillary sinus (T4bN0M0, stage IVB). He had undergone surgical resection, followed by CCRT. ORN developed in the right maxillary sinus and he underwent sequestrectomy and delayed reconstruction with a folded rectus abdominis myocutaneous free flap in October 2004. Poor wound healing due to cancer recurrence was confirmed by biopsy and he was transferred to our institution. Two treatment options were offered, including salvage CCRT or surgical excision, and he chose the latter.

Right-sided radical maxillectomy including right eye enucleation was performed. A huge through-and-through maxillary defect about 12×10 cm in size was left (Fig. 2). We designed a perforator-based free ALT flap (16×12 cm) on the left thigh (Fig. 3A). The location of the main

Received: January 10, 2012; Revised: March 13, 2012;
Accepted: March 23, 2012

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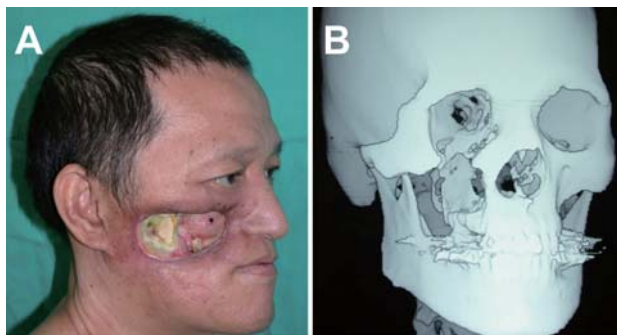


Fig. 1 (A) Preoperative photo shows a through-and-through defect over the right maxillary region. (B) Three-dimensional bone CT reconstruction image demonstrates the bony defect of maxillary sinus wall.

cutaneous perforators was detected and marked with an ultrasound Doppler. One musculocutaneous perforator was dissected through the muscle down to their origin on the main pedicle. Free ALT flap was used for the reconstruction of external facial defect and its perforator was anastomosed to the superficial temporal vessel under microscope. Moreover, via elliptical incision, the pedicled PMMC flap (6×4 cm), designed around the nipple, extending from the midline medially and crossing the lateral border of the muscle laterally, was raised in the subfascial plane (Fig. 3B). The muscle was dissected and cut till the clavicle with the identified thoracoacromial artery. After adequate tunneling of the neck skin in a subfascial plane, the pedicled PMMC flap was transposed over the clavicle to the intraoral lining defect. The two donor sites were primarily closed. Finally, about one month later, an adhesive eye prosthesis patch with glasses was employed to improve cosmesis.

The patient had an uneventful recovery with an excellent functional result and cosmetic appearance (Fig. 4). His speech was intelligible and he enjoyed free intake of full diet. He remained socially active and did not feel embarrassed among people. Meanwhile, there was no tumor recurrence or distant metastasis discovered at regular physical check-up, PET scan and MRI studies during the 7-year follow-up.

DISCUSSION

The role of surgery in treating recurrent advanced sinonasal malignancies is controversial because of the frustratingly low 5-year survival rate and considerable morbidity with facial disfigurement.²⁻³ According to the



Fig. 2 Intraoperative image demonstrates the huge through-and-through maxillary defect about 12 x 10 cm in size.

NCCN guidelines regarding management of recurrent head and neck cancer, the mainstay treatment depends on whether the cancer is resectable.⁴ In patients with unresectable recurrence, CCRT remained the dominant treatment modality. However, some patients might be considered inoperable merely owing to the concern of many reconstructive surgeons that their individual skills were not comparable to those techniques reported. Hence, the situation is complicated and judgment is not easy. In view of the comorbid ORN, our patient is not a good candidate for salvage CCRT and re-irradiation is generally not considered to be curative in recurrent cases. The morbidities of CCRT are also high and may outweigh the benefits.⁵ Therefore, in the present patient, wide tumor resection is more appropriate than CCRT.

A curative surgery requires a powerful reconstruction plan as backup. To reconstruct the mid-face, elimination of dead space and maintenance of a barrier between the central nervous system and the upper aerodigestive tract are crucial. In view of the defect which involved both external face and intraoral lining, the reconstructive options include double free flap with different recipient vessels, single but folded flap or combination of free flap and pedicled flap. In our case, the limited available recipient vessels following previous operation and irradiation pose difficulty for free flap transfer and may lead to higher failure rate. Therefore, to transfer the double free flaps

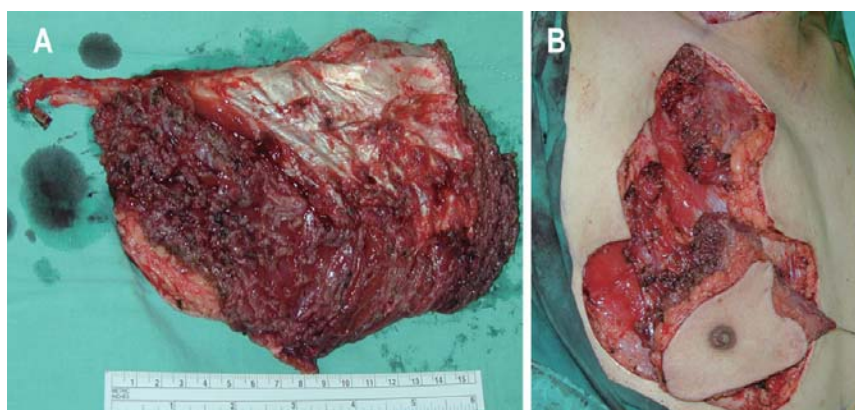


Fig. 3 (A) The harvested flap contains the free ALT flap with one vascular pedicle. (B) The design of the pedicled PMMC flap.

might be not applicable. A combination of free tissue transfer, pedicled myocutaneous flap and a customized maxillary prosthesis offered an excellent solution.

The ALT flap is an extremely versatile flap and has become the flap of choice for head and neck reconstruction in Asia, including Taiwan.⁷ It offers many advantages including: 1) a large skin paddle with good color match; 2) adequate length of its pedicle for anastomosis with the recipient vessels in the neck region without tension and with excellent size match; and 3) short operative time with surgeries for tumor resection and flap elevation performed simultaneously by two teams. Donor-site morbidity is minimal and the scar is easily concealed.⁸ The other options include radial forearm flap, calvarial flap, scapular free flap or iliac flap. However, they had disadvantages such as a highly visible scar on the forearm, minimal soft tissue transfer without skin, the need for patients to be turned during operation, and a relative short vascular pedicle.⁹ We have recently investigated the value of computed tomographic angiography to delineate the ALT flap angiosome preoperatively for enhancing transfer safety. The successful rate with the aid of computed tomographic angiography in our study approaches 100% and no major complication was encountered.¹⁰

In this case, we use the pedicled PMMC flap to provide extra bulk for reconstructing the intraoral lining. With its own blood supply, the PMMC flap was especially applicable in salvage cases. Because of its anatomic proximity, the pectoralis major myocutaneous flap was the most popular and dependable pedicled flap for transferring muscle and skin for head and neck reconstruction before the use of free vascularized flaps became routine.¹¹ Its additional advantages include the relative ease to har-



Fig. 4 Seven-year postoperative appearance shows an excellent aesthetic and functional result.

vest and its overall reliability in terms of flap survival. The PMMC flap can provide sufficient volumetric needs to eliminate dead space and at the same time support and not interfere with reestablishment of oral function. Good mobility of the tongue and speech function, one of the most important functions of the oral cavity, can be preserved.¹² Moreover, there are also benefits of good adaptation and matching of the skin paddle to the oral soft tissues.

In view of the above, we recommend the free ALT flap and pedicled PMMC flap for salvage of a complicated recurrent maxillary sinus cancer and defect in orbital floor and hard palate. Uneventful recovery with excellent structural support and aesthetic result can be achieved. The use of cosmetic prosthesis can improve the patient's appearance and decrease facial disfigurement. A successful oncologic surgery should provide not only complete eradication of tumors but also ideal reconstruction which allows patients to return to his social network. Although it is difficult to conclude from a single case study whether this technique is the best choice in such instances, the presented technique offers a practical and effective reconstructive salvage option.

CONCLUSION

The free ALT flap and pedicled PMMC flap are well suited for midface reconstruction in salvage case. This technique offers minimal donor-site morbidity, quick recovery, and a short hospital stay.

FINANCIAL DISCLOSURE

There was no conflict of interests in this article.

AUTHOR CONTRIBUTION

1. Shao-Cheng Liu, MD: data collection and preparation of draft.
2. Wan-Fu Su: data collection, reviewer.
3. Shyi-Gen Chen, MD, PhD: surgeon and editing of manuscript.

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